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**Yoo**

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(54) **E-BOOK**

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(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 780 days.

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(57) **ABSTRACT**

(30) **Foreign Application Priority Data**

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Disclosed herein is an e-book, the e-book including a first cover provided with a display panel outputting a screen, a second cover mounted on the first cover to furnish a receiving space between the first cover and the second cover, a support frame supporting the display panel and making a circuit substrate safely placed thereon, and a speaker electrically connected to the circuit substrate, wherein a sound groove is formed in the support frame, indented towards the first cover side to safely place the speaker, and a distance from the support frame surface to the sound groove bottom surface is formed to be equal to or larger than a distance from the sound groove bottom surface to the speaker surface, capable of enhancing an output effect of sound and minimizing a space occupied by a soundbox of a speaker and thus realizing overall slimness.

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**H04R 1/02** (2006.01)  
**G06F 1/16** (2006.01)

(52) **U.S. Cl.**  
CPC ..... **G06F 1/1688** (2013.01); **G06F 1/1626** (2013.01)

(58) **Field of Classification Search**  
CPC ..... H04R 5/02; G06F 1/1688; G06F 1/1626  
USPC ..... 381/333  
See application file for complete search history.

**8 Claims, 1 Drawing Sheet**

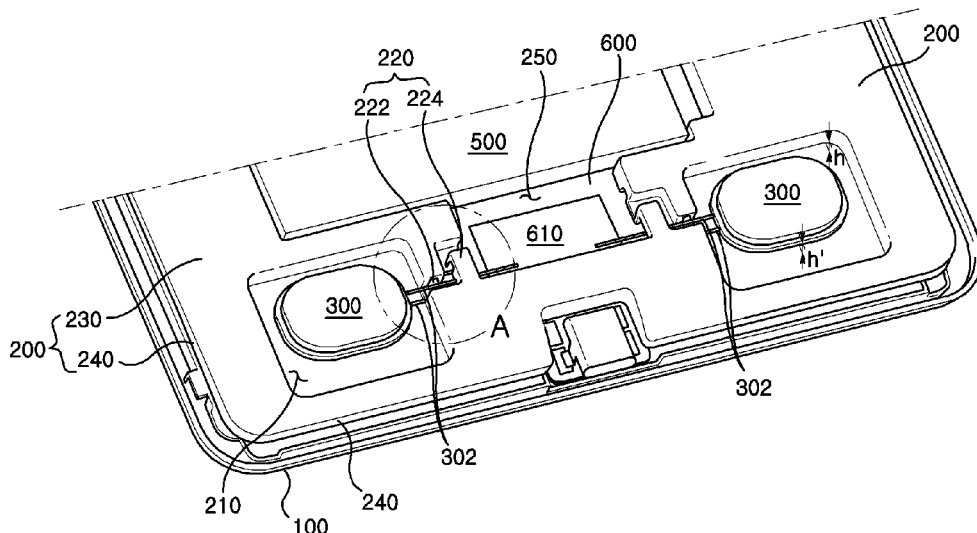


Fig. 1

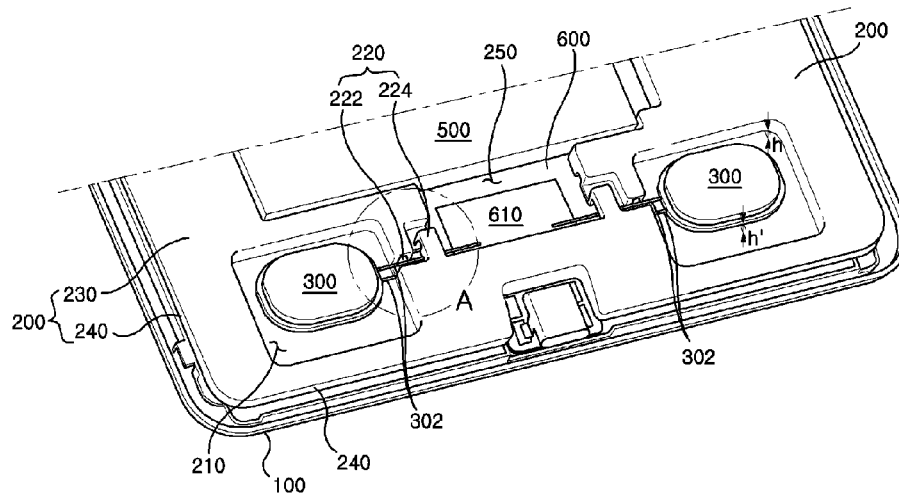


Fig. 2

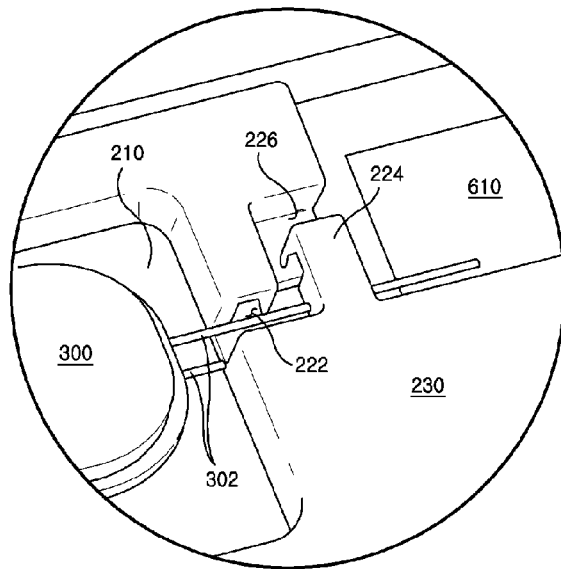
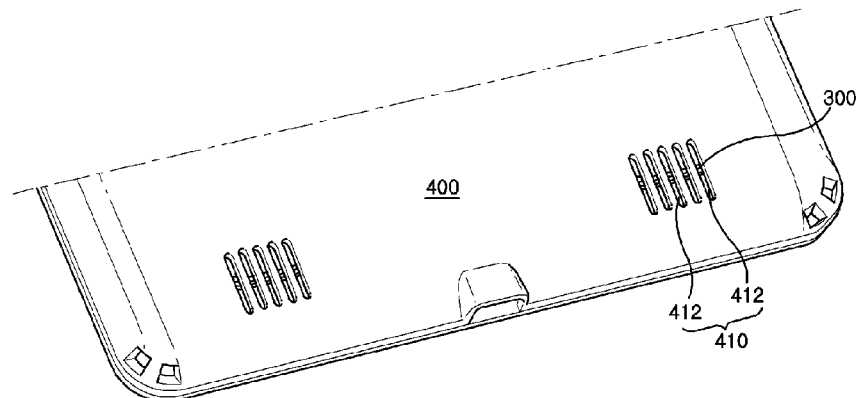


Fig. 3



# 1

## E-BOOK

### TECHNICAL FIELD

The present invention relates to an e-book capable of 5  
perusing an electronic document.

### BACKGROUND ART

Limelights have been taken into an e-book since it is light- 10  
weight and thin compared to an existing heavy and easy-to-  
carry paper book and if only storage capacity fully provided,  
almost library-level material may be carried on and read.

A recent e-book is not limited to a simple character-reading 15  
function, and can output pictures and images at the same time  
as a sound and voice outgoing in order to give audio-visual  
complacency to users.

The e-book outputs voice and sound through a speaker 20  
mounted on a main body case, and in order to enhance the  
output effect of the speaker, provides a separate soundbox for  
use in a state of the soundbox being mounted on a speaker.

In a general structure of the e-book, a display panel out- 25  
putting photographs, figures, pictures, etc. is mounted on a  
main body case embedded with a circuit substrate provided  
with various kinds of components, and a keypad assembly  
inputting a user command is disposed at one side of the  
display panel.

The speaker is unavoidably mounted on one side or both 30  
sides of a keypad assembly as a general e-book arrangement  
structure, and if the keypad assembly occupying area is  
reduced for the mounting of the speaker, causing inconven-  
iencies of an operation, the entire size of the e-book becomes  
larger in the end.

At this time, because the soundbox is manufactured in a die 35  
to be mounted separately of the main body case, a width of  
each side of the keypad assembly becomes as much wider as  
a space where the soundbox is occupied.

To improve such problems, in a case the soundbox is 40  
mounted at both sides of the keypad assembly by substan-  
tially decreasing the area of the keypad assembly while keep-  
ing the size of the display panel and the main body case as it  
is, an end part shape of a circuit substrate mounted on the  
main body case is complicated.

Further, in a case the speaker is mounted around the back 45  
surface of the circuit substrate and finished by the main body  
case while omitting the soundbox occupying space, an output  
efficiency of sound and voice deteriorates.

### DISCLOSURE OF INVENTION

#### Technical Problem

Devised in order to improve such problems, an object of the 55  
present invention is to provide an e-book having a structural  
strength without any difficulty in slimness realization by  
properly disposing a soundbox of a speaker as well as enhanc-  
ing an output effect of sound and voice.

The technical challenge to be achieved by the present 60  
invention is not limited to the aforementioned technical chal-  
lenge, and those skilled in the art would clearly understand  
other un-mentioned technical challenges from the following  
recitation.

#### Solution to Problem

An e-book according to one embodiment of the present  
invention includes a first cover provided with a display panel

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outputting a screen, a second cover mounted on the first cover  
to provide a receiving space between the first cover and the  
second cover, a support frame supporting the display panel  
and making a circuit substrate safely placed thereon, and a  
speaker electrically connected to the circuit substrate, 5  
wherein a sound groove is formed in the support frame,  
indented towards the first cover side to safely place the  
speaker, and a distance from the support frame surface to the  
sound groove bottom surface is equal to or greater than a  
distance from the sound groove bottom surface to the speaker  
surface.

The support frame further includes a guide guiding in a 10  
direction that a cable of the speaker is fixed to the circuit  
substrate.

The support frame includes a main plate safely placing the 15  
circuit substrate and battery, and a partition wall projecting  
along the edges of the main plate to isolate the main plate  
from the first cover.

The sound groove is constructed at opposite sides of the 20  
support frame at a certain interval to form one pair, and the  
guide is formed between a pair of sound grooves to face each  
other, and a hole is formed between the guide to be connected  
to the circuit substrate.

The guide includes a guide groove formed from one side of 25  
the sound groove to a hole to guide a cable, and a leave  
projectingly formed at one side of the guide groove to press  
down the cable.

The circuit substrate is provided with a connector coupling 30  
to an end part of the cable.

In the second cover, a grill emitting sound at a position  
corresponding to the sound groove towards outside is formed.

The guide groove further includes an assisting groove 35  
formed at a certain gap from an end part of the leave for  
connection to the hole.

An e-book according to another embodiment of the inven- 40  
tion includes a display panel outputting a screen, a support  
frame supporting the display panel on its front surface, and  
having a circuit substrate safely placed, and a speaker elec-  
trically connected to the circuit substrate, wherein a sound  
groove safely placing the speaker is formed on the rear sur-  
face of the support frame.

#### Advantageous Effects of Invention

An e-book of the present invention can adopt a structure 45  
that a sound groove is integrally formed onto a support frame  
supporting a display panel and a circuit panel, and a speaker  
is mounted on the sound groove, thereby enhancing an output  
effect of voice and sound and minimizing a space occupied by  
a soundbox of a speaker and thus realizing overall slimness  
without any difficulty.

And, an e-book of the invention can properly distribute an 55  
external force acting on a space by a soundbox formed depth  
by virtue of a soundbox arrangement structure integrally  
formed in the support frame, thereby enhancing a structural  
strength.

#### BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a partial perspective view indicating the remain- 60  
ing construction of an e-book divided from a second cover of  
the e-book;

FIG. 2 is an enlarged partial perspective view of FIG. 1; and

FIG. 3 is a partial view indicating a second cover mounted 65  
state of an e-book according to one embodiment of the inven-  
tion.

## BEST MODE FOR CARRYING OUT THE INVENTION

Hereinafter, a preferred embodiment of the invention will be described in consideration of the annexed drawings.

The size and shape of components shown in the drawings during this procedure may be exaggerated or simplified for the sake of description's clarity and conveniences. Also, specially defined terms in consideration of the construction and function of the present invention may be varied according to the intention and custom of users and operators. Such terms-related definition should be made based on recitations throughout the entire specification.

FIG. 1 is a partial perspective view indicating the remaining construction of an e-book divided from a second cover of the e-book, FIG. 2 is an enlarged partial perspective view of FIG. 1, and FIG. 3 is a partial view indicating a state finished with a second cover of an e-book according to one embodiment of the invention.

The present invention includes a first cover **100**, a support frame **200**, a speaker **300**, and a second cover **400**.

A first cover **100** supports edges of a display panel (hereinafter, not shown) outputting a screen, and each kind of circuit component such as a support frame **200** and the display panel is built therein.

The display panel may be variously selected from a manufacture environment or a manufacturing condition such as an OLED panel and a flexible electronic film panel as well as an LCD panel.

On a support frame **200**, a circuit substrate **600** electrically connected to the display panel is safely placed and it is coupled to edges of a first cover **100**.

A support frame **200** has the display panel and a circuit substrate **600** safely placed to be coupled to a first cover **100**, but it acts as an endoskeleton by having a second cover **200** separated around a certain distance from the display panel and a circuit substrate **600** in order to effectively distribute and support an external force and a shock imposed on the display panel and a circuit substrate **600**.

A speaker **300** is safely placed on a support frame **200** to be electrically connected to a circuit substrate **600**, and embodies an audio effect together with the display panel realizing a visual effect.

A second cover **400** is entirely connected to a first cover **100**, and a receiving space is provided between a first cover and a second cover, and this receiving space is used to receive the display panel, a circuit panel **600**, a support frame **200**, etc.

Herein, a support frame **200** is therein formed of a soundbox **210** indented towards a first cover **100** side for the safe placement of a speaker **300**, and a distance (h) from the surface of a support frame **200** to a bottom surface of a soundbox **210** is longer than or equal to a distance (h') from a bottom surface of a soundbox **210** to the surface of a speaker **300** for a smooth finish coupling of a second cover **400**.

That is, if a speaker **300** is safely placed in a soundbox **210**, it can prohibit a speaker **300** protruding from the surface of a support frame **200** to prevent an interference occurrence between a second cover **400** and a speaker **300** when a second cover **400** is coupled.

## MODE FOR THE INVENTION

The present invention is applicable and implementable by the above-mentioned configuration, and an explanation for a major component for the interpretation of various embodiments follows.

A support frame **200** safely placing and supporting components such as the display panel and a circuit substrate **600** built in a first cover **100** and a second cover **400** to distribute a shock and an external force throughout the entire surface, includes a main plate **230** and a partition wall **240**.

A main plate **230** is made in a flat-plate shape corresponding to edges of a first cover **100**, and is therein formed an aperture safely placing a battery **500** to be electrically connected to a circuit substrate by the safe placement of the battery **500**, and it provides an area safely placing a circuit substrate **600** and the display panel.

A partition wall **240** projects along edges of a main plate **230** to separate a main plate **230** from a first cover **100**, and a projecting height of a partition wall **240** may be properly formed considering the thickness of components such as the display panel and a circuit substrate **600** safely placed on a main plate **230**.

In the meantime, in a support frame **200**, a guide **220** is formed guiding to fix a cable **302** of a speaker **300** to a circuit substrate **600** at one side of a soundbox **210**. A guide **220** guides a cable **302** for the purpose of protecting a minute component weak to an external shock and an external force such as a connecting line **302** from being exposed and easily performing an electric connection with a circuit substrate **600**.

Herein, a sound groove **210** is disposed in one pair at a certain interval at opposite sides of a main plate **230** for the output of realistic voice and sound. And, a guide **220** is formed between a pair of sound grooves **210**, and a hole **250** connecting to a circuit substrate **600** is formed among a guide **220** arranged to face each other.

At this time, a guide **220** includes a guide groove **222** formed in a cut shape from one side of sound groove **210** to a hole **250** to pass through a cable **302**, and a leave **224** formed in perpendicular to the guide groove **222** to press down a cable **302**.

A cable **302** of a speaker **300** connects to a hole **250** side through between a guide groove **222** and a leave **224**.

And, on a circuit substrate **600**, a connector **610** is mounted connecting to an end part of a cable **302**.

Also, a guide groove **222** further includes an assisting groove **226** formed proximate to an end part of a leave **224** as shown in FIG. 2 to be connected to a hole **250**.

An assisting groove **226** acts as a passage guiding based on a position where components such as a mounted connector **610** is disposed when a bypass connection is needed.

A second cover **400** finishes an exposure part of a support frame **200** as described above, and in a second cover **400**, a grill **410** is formed including at least one or more of slits **412** penetrated at a position corresponding to a sound groove **210**.

A grill **410** is provided for a user to easily hear voice or sound outputted through a speaker **300**, and modifications and applications such as mounting a multiple of punctured holes or a mesh besides a formation like a slit **412** as shown in the figure are possible.

While embodiments according to the invention have been described at the foregoing part, they are merely exemplary provided, and it would be apparent to those skilled in the art that embodiments around various modifications and equivalents can be made therein.

Thus, the genuine protection scope of the invention technology should be defined by the following claims.

## INDUSTRIAL APPLICABILITY

As described above, it can be known that the present invention considers its basic technical spirit to provide an e-book

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capable of enhancing an output effect of voice and sound and minimizing a space occupied by a soundbox of a speaker and realizing overall slimness without any difficulty as well as having a structural strength.

The invention claimed is:

1. An e-book, comprising:

a first cover provided with a display panel outputting a screen;

a second cover mounted on the first cover to provide a receiving space between the first cover and the second cover;

a support frame supporting the display panel and making a circuit substrate safely placed thereon; and

a speaker electrically connected to the circuit substrate, wherein a sound groove is formed in the support frame, indented towards the first cover side to safely place the speaker, and

a distance from the support frame surface to the sound groove bottom surface is equal to or greater than a distance from the sound groove bottom surface to the speaker surface.

2. The e-book as claimed in claim 1, wherein the support frame further includes a guide guiding in a direction that a cable of the speaker is fixed to the circuit substrate.

3. The e-book as claimed in claim 1, wherein the support frame includes,

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a main plate safely placing the circuit substrate and a battery, and

a partition wall projecting along the edges of the main plate to isolate the main plate from the first cover.

4. The e-book as claimed in claim 2,

wherein the sound groove is constructed at opposite sides of the support frame at a certain interval to form one pair, and the guide is formed between a pair of sound grooves to face each other, and a hole is formed between the guide to be connected to the circuit substrate.

5. The e-book as claimed in claim 4, wherein the circuit substrate is provided with a connector coupled to an end part of the cable.

6. The e-book as claimed in claim 4, wherein a guide includes,

a guide groove formed from one side of the sound groove to a hole to guide a cable, and

a leave projectingly formed at one side of the guide groove to press down the cable.

7. The e-book as claimed in claim 1, wherein the circuit substrate is provided with a connector coupling to an end part of the cable.

8. The e-book as claimed in claim 5, wherein the guide groove further includes an assisting groove formed at a certain gap from an end part of the leave for connection to the hole.

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